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Barriers to WDM Deployment on Military Platforms

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DARPA/MTO
WDM for Military Platforms Workshop
18 April 2000

Report Documentation Page

Form Approved
OMB No. 0704-0188

1. REPORT DATE	2. REPORT TYPE	3. DATES COVERED
18 APR 2000	**N/A**	**-**

4. TITLE AND SUBTITLE	5a. CONTRACT NUMBER
Barriers to WDM Deployment on Military Platforms	5b. GRANT NUMBER
	5c. PROGRAM ELEMENT NUMBER
6. AUTHOR(S)	5d. PROJECT NUMBER
	5e. TASK NUMBER
	5f. WORK UNIT NUMBER
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) **BAE Systems Aerospace Electronics Lansdale, PA**	8. PERFORMING ORGANIZATION REPORT NUMBER
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)	10. SPONSOR/MONITOR'S ACRONYM(S)
	11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION/AVAILABILITY STATEMENT
Approved for public release, distribution unlimited

13. SUPPLEMENTARY NOTES
DARPA/MTO, WDM for Military Platforms Workshop held in McLean, VA on April 18-19, 2000, The original document contains color images.

14. ABSTRACT

15. SUBJECT TERMS

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT	b. ABSTRACT	c. THIS PAGE			
unclassified	**unclassified**	**unclassified**	**UU**	**7**	

Militarized (Flight-Qualified) 18 GHz Single-Mode Transmitters

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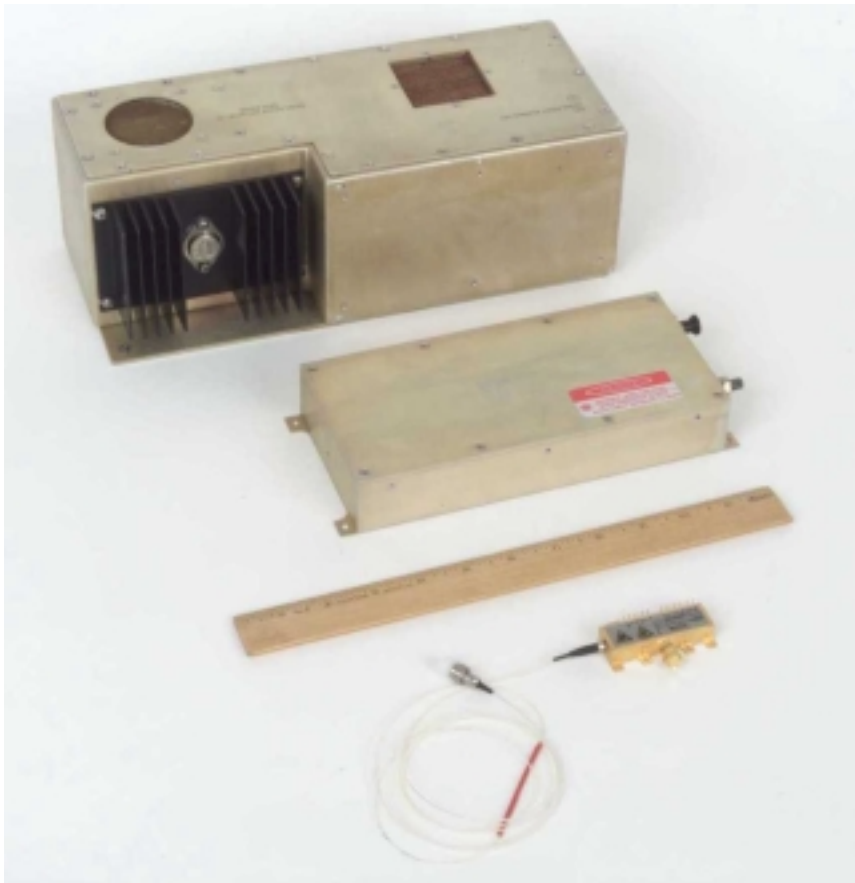

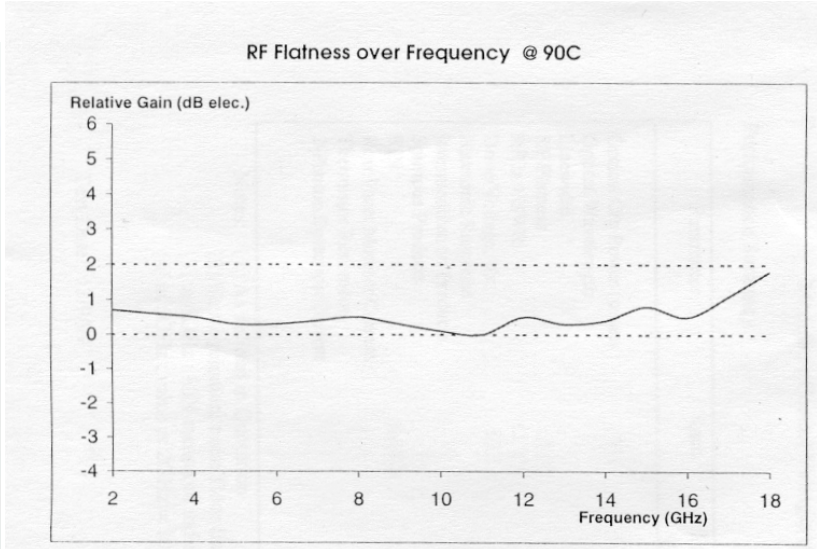

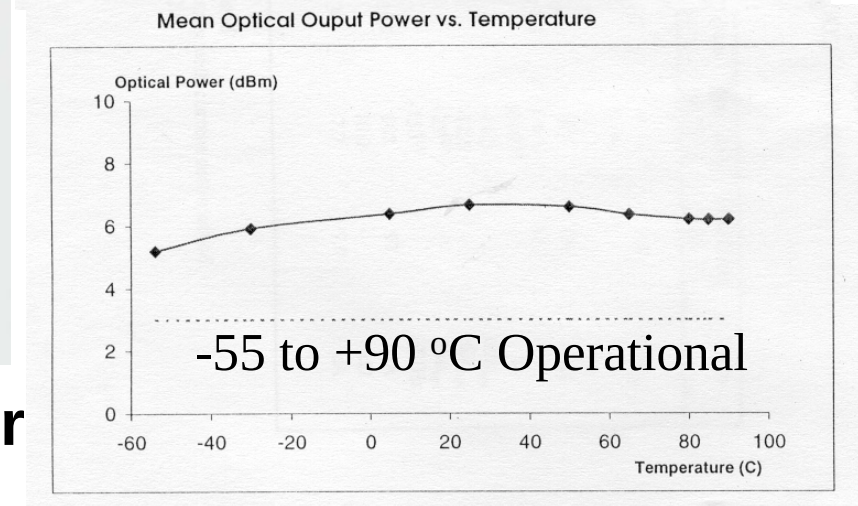

Mature, Military Hardware for Point-to-Point Applications

Generic WDM for Non-Blocking, Full Broadcast Antenna Selection

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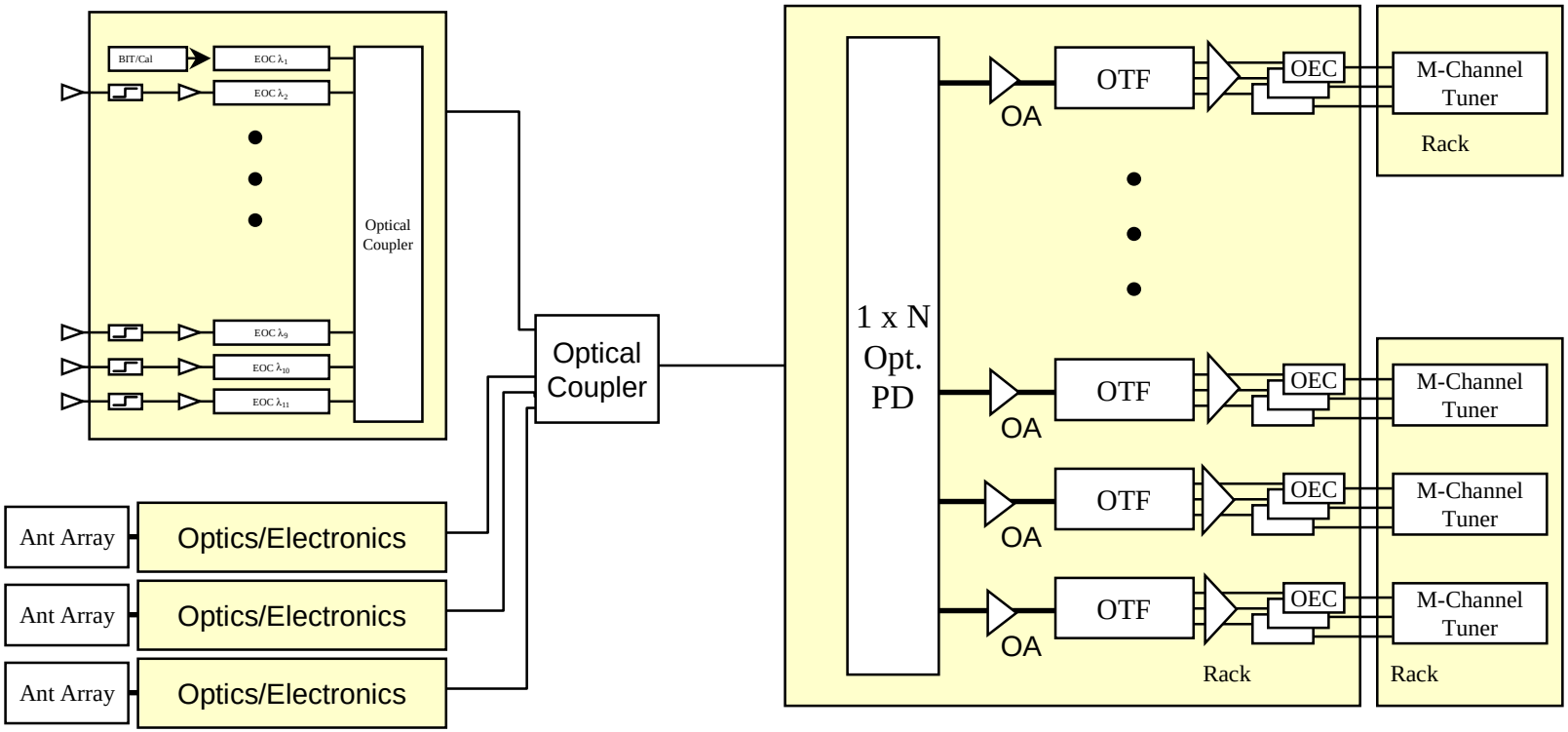

WDM Fiber Network Replacing Conventional RF Cabling, Optical Power Divider (PD) and Optical Tunable Filters (OTF) Replacing Conventional RF Switch; All Antenna Signals Available at Each Receiver

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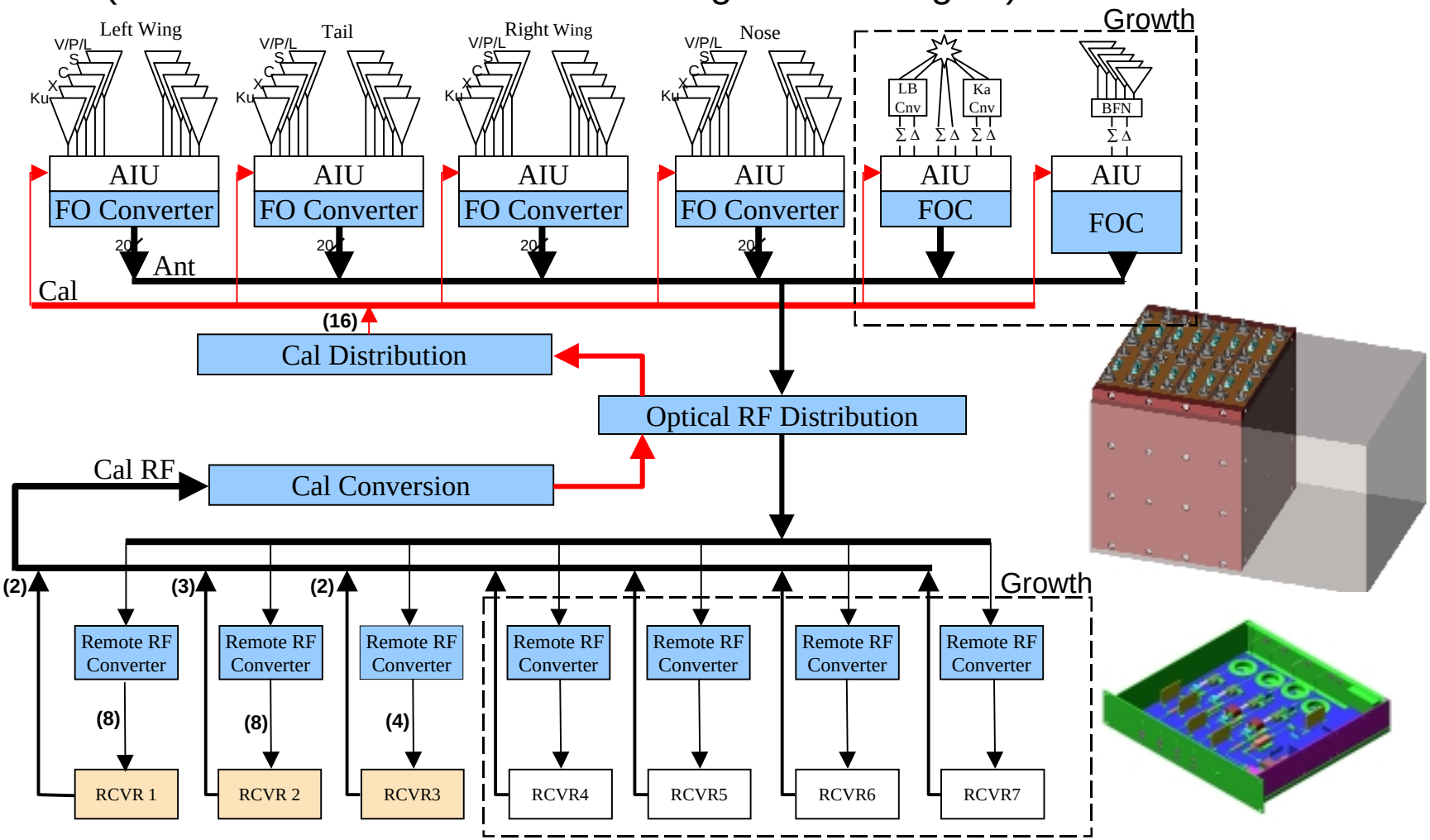
Current Analog 18 GHz Link WDM System

(80 Antennas to 16 Receivers using 4 Wavelengths)



Dual Channel (10.1 and 10.5 GHz) Switching (Optical Tunable Filter)

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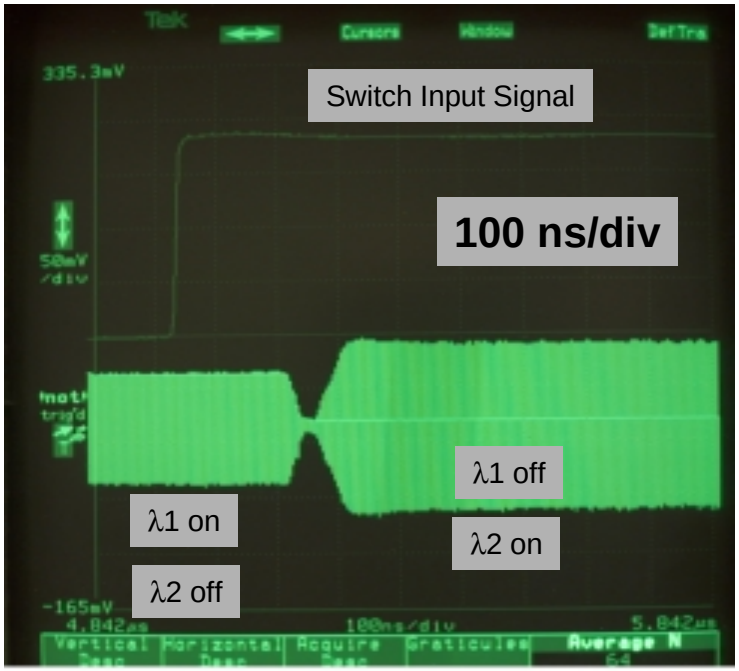

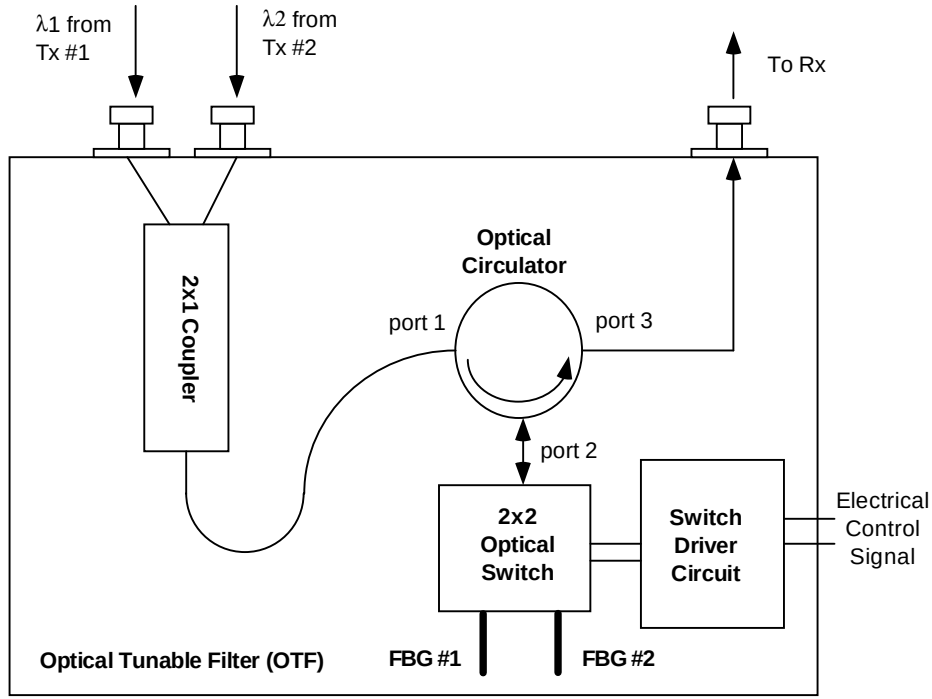

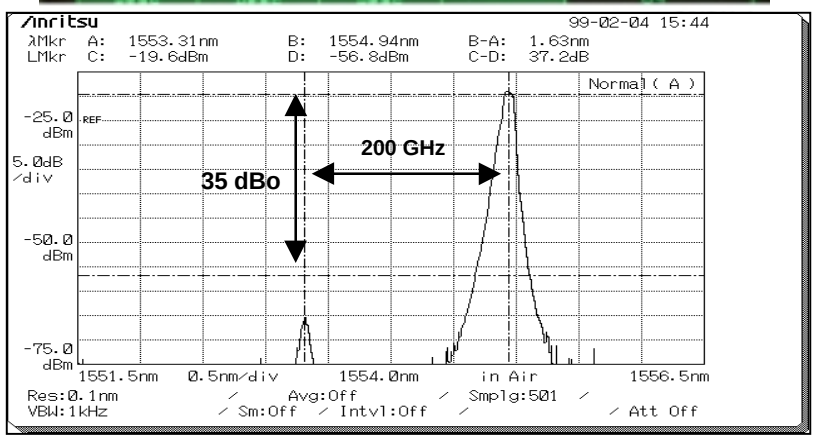

Switching Speed ~80 ns
RF Crosstalk <-76 dBe
RF Bandwidth 18 GHz
Insertion Loss ~8 dBe

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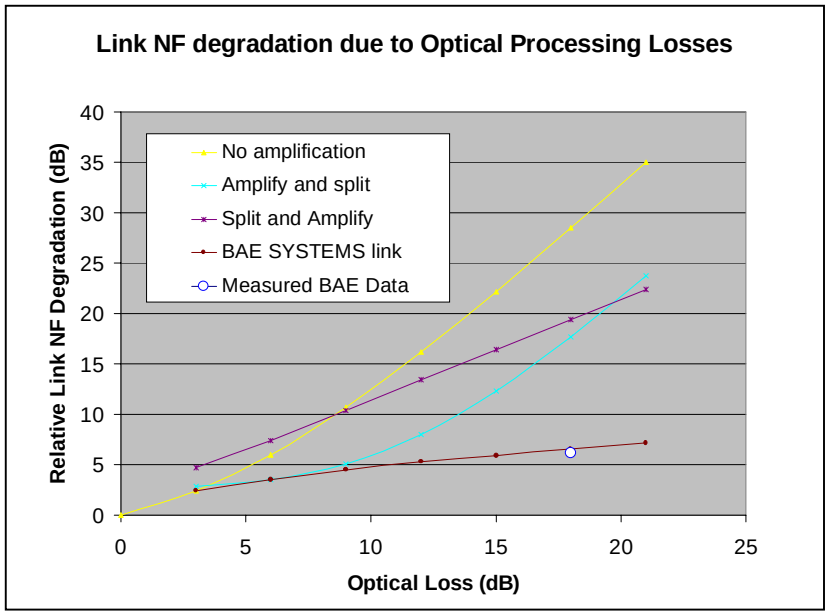
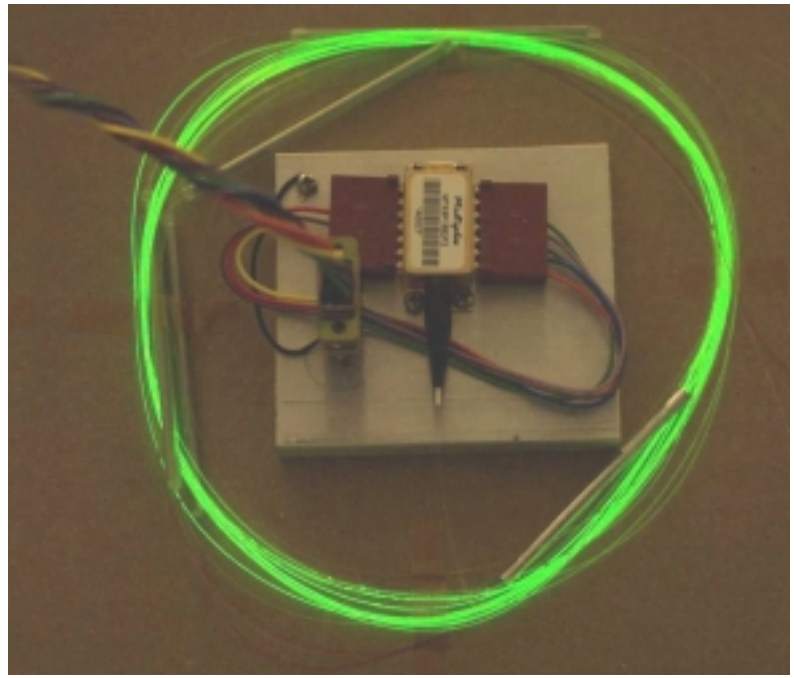
Low Noise Optically Amplified Microwave Links





BAE SYSTEMS has developed proprietary technology to reduce the noise figure (RIN ~ -157 dB/Hz) of fiber optic microwave links with high optical processing losses due to WDM, switching, and other distribution components.

Desparately Needed Developments to Enable Replacement of RF Switches

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- **Low Insertion Loss, High-Speed Switches**
  - 10 ms SONET Switching is Too Slow for Military Applications
  - <10 μs is Typical Requirement (<100 ns for High POI Appl.)
  - Narrow Bandwidth (FP), High-Speed Switches Don't Help!!
- **Low-RIN EDFAs**
  - WDM Requires Muxing and Demuxing Multiple Channels
  - EDFAs **ALWAYS** Degrade Analog Link Performance
  - EDFA RIN Must be Reduced Below -155 dB/Hz
- **High Crosstalk Suppression** Between WDM Channels (Optical Switches for Tunable λ Filtering)
  - Easy for Narrowband RF Signals (<1 GHz)
  - Difficult for 18 GHz and Higher Sidebands
    - Fiber Bragg Gratings are the Only Demonstrated Technology to Achieve > 35 dBo Crosstalk Suppression for 18 GHz Sidebands
- **High-Power WDM DFB Arrays**
  - >40 mW/Channel @ RIN <-160 dB/Hz, < 1 MHz Linewidth